

Appl. No. 10/030,867
Amdt. Dated September 11, 2003
Reply to Office Action of June 11, 2003

Attorney Docket No. 81839.0105
Customer No. 26021

This listing of claims replaces all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Original): A method for growing a semiconductor single crystal according to the Czochralski method utilizing an apparatus for producing a semiconductor single crystal having a crucible to be charged with a raw material, a heater surrounding the crucible, pulling means for bringing a seed crystal into contact with a melt contained in the crucible and growing a single crystal and a metal chamber for accommodating the foregoing members, wherein the apparatus is provided with subsidiary heating means below the crucible and the single crystal is pulled with subsidiarily heating the crucible by the subsidiary heating means in addition to the heating by the heater surrounding the crucible for a period after a ratio of a weight of the growing crystal during the pulling of the crystal relative to a weight of raw material melt before the growing becomes 60% or more.

2. (Original): The method for growing a semiconductor single crystal according to Claim 1, wherein the heating by the subsidiary heating means is performed so that temperature gradient of the single crystal surface along the pulling axis direction should be constant irrespective of the weight ratio of the growing crystal relative to the weight of raw material melt before the growing.

3. (Previously Presented): The method for growing a semiconductor single crystal according to Claim 1, wherein electric power values of the heater surrounding the crucible and the subsidiary heating means and/or a ratio of the both power values are obtained by calculation based on global heat transfer analysis, the obtained value(s) is/are used as a target value or values of control, and electric powers supplied to the heater and the subsidiary heating means are

controlled to be as near the target value or values as possible during the pulling of the single crystal.

4. (Original): A method for growing a semiconductor single crystal according to the Czochralski method utilizing an apparatus for producing a semiconductor single crystal having a crucible to be charged with a raw material, a heater surrounding the crucible, pulling means for bringing a seed crystal into contact with a melt contained in the crucible and growing a single crystal and a metal chamber for accommodating the foregoing members, wherein the apparatus is provided with subsidiary heating means below the crucible, and after a grown single crystal is detached from the melt and taken out from the apparatus for producing a crystal, a raw material is newly added to the raw material remained in the crucible and melted, and when a seed crystal is brought into contact with the melt to pull a single crystal again, the crucible is heated by the heater surrounding the crucible and the subsidiary heating means so that the raw material melt should not be solidified at least for a period from the point of the detachment of the single crystal ingot to the point of complete melting of the raw material in the crucible including the raw material newly added thereto.

5. (Previously Presented): The method for growing a semiconductor single crystal according to Claim 2, wherein electric power values of the heater surrounding the crucible and the subsidiary heating means and/or a ratio of the both power values are obtained by calculation based on global heat transfer analysis, the obtained value(s) is/are used as a target value or values of control, and electric powers supplied to the heater and the subsidiary heating means are controlled to be as near the target value or values as possible during the pulling of the single crystal.